

33-KILOVOLT POWER LINE NASSRIYA, IRAQ



SIGIR PA-08-127
JULY 22, 2008

Report Documentation Page				Form Approved OMB No. 0704-0188	
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1. REPORT DATE 22 JUL 2008		2. REPORT TYPE		3. DATES COVERED 00-00-2008 to 00-00-2008	
4. TITLE AND SUBTITLE 33-Kilovolt Power Line, Nassriya, Iraq				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Office of the Special Inspector General for Iraq Reconstruction,400 Army-Navy Drive,Arlington,VA,22202-4704				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 23	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			



SPECIAL INSPECTOR GENERAL FOR IRAQ RECONSTRUCTION

July 22, 2008

MEMORANDUM FOR COMMANDING GENERAL, MULTI-NATIONAL FORCES-IRAQ
COMMANDING GENERAL, JOINT CONTRACTING COMMAND-
IRAQ/AFGHANISTAN
COMMANDING GENERAL, GULF REGION DIVISION, U.S.
ARMY CORPS OF ENGINEERS
DIRECTOR, IRAQ TRANSITION ASSISTANCE OFFICE

SUBJECT: Report on Construction of the 33-Kilovolt Power Line, Nassriya, Iraq (Report
Number SIGIR PA-08-127)

The Office of the Special Inspector General for Iraq Reconstruction is assessing projects funded under the Economic Support Fund to provide real-time relief and reconstruction information to interested parties to enable appropriate action, when warranted.

We are providing this report for your information and use. It addresses the current status of the 33-Kilovolt Power Line, Nassriya, Iraq and whether intended objectives will be achieved.

This report does not contain recommendations for corrective action. As a result, management comments were not required. Representatives of the Gulf Region Division of the U.S. Army Corps of Engineers reviewed a draft of this report and had no comments.

We appreciate the courtesies extended to our staff. If you have any questions please contact Mr. Brian M. Flynn at brian.flynn@sigir.mil or at 914-360-0607. For public queries concerning this report, please contact SIGIR Public Affairs at publicaffairs@sigir.mil or at 703-428-1100.

Stuart W. Bowen, Jr.
Inspector General

Special Inspector General for Iraq Reconstruction

SIGIR PA-08-127

July 22, 2008

33-Kilovolt Power Line, Nassriya, Iraq

Synopsis

Introduction. The Special Inspector General for Iraq Reconstruction initiated this project assessment as part of its continuing assessments of selected activities of the Economic Support Fund. SIGIR conducted this project assessment in accordance with the Quality Standards for Inspections issued by the President's Council on Integrity and Efficiency. The assessment team included a professional engineer/inspector and an auditor/inspector.

Project Objective. The objective of this Economic Support Fund project was to design and construct the equipment required for a 33-kilovolt overhead line from the Nassriya Old Substation to the Al-Shimiyah Substation.

Project Assessment Objectives. The objective of this project assessment was to provide real-time information on relief and reconstruction projects to interested parties to enable appropriate action to be taken, when warranted. Specifically, SIGIR addressed these questions:

1. Were the project components adequately designed before construction or installation?
2. Did the construction or rehabilitation meet the standards of the design?
3. Were the quality management programs being used adequately?
4. Was the sustainability of the project addressed?
5. Were the project results consistent with the original objectives?

Conclusions. The assessment determined that:

1. Adequate design documentation for project components was not available for the 33-Kilovolt Power Line project. The contractor's design package was not complete and lacked sufficient details. Specifically, the design documents did not provide any preliminary alignment plans with topographic surveys, soil reports, right-of-way plans, construction drawings (detail sheets, quantity sheets, or environmental protection plan sheets), structural calculations, foundation calculations, technical specifications, catalog cuts of equipment specified, general design notes with assumptions made, or standard drawings referenced.
2. At the time of the site visit, the project was 65% complete. In general, the construction appeared to meet the standards of the Statement of Work. During its visit to the project site, the inspection team did not observe significant deficiencies. The observed construction work associated with the 33-Kilovolt Power Line project appeared to meet the standards of the contract.
3. The contractor's quality control plan was inadequate to guide a quality management program. Specifically, the quality control plan required the

contractor to maintain construction inspection reports. The contractor provided to the Gulf Region South project engineer one quality control report that did not provide meaningful information and did not identify any significant construction deficiencies. The quality control plan did provide specific details regarding the responsibilities of key personnel, document control methods, special processes, civil works, inspection and testing, records, and the turnover to the United States Army Corps of Engineers process.

Despite the weaknesses in contractor quality control, the government's quality assurance program was effective in ensuring that the construction of the 33-Kilovolt Power Line project was adequate. The United States Army Corps of Engineers quality assurance representatives maintained daily quality assurance reports, which documented deficiencies identified at the site. SIGIR found these reports to be sufficiently complete, accurate, and timely. The reports contained project-specific information to document construction progress and highlight deficiencies. Also, the quality assurance representatives supplemented the daily reports with detailed photographs that reinforced the narrative information provided in the reports. Further, the quality assurance team followed up on any reported deficiencies to confirm that the contractor took the necessary corrective actions. The government's quality assurance program compensated for the inadequate contractor quality control program and is ensuring the successful completion of the 33-Kilovolt Power Line project.

4. Sustainability was addressed in the contract requirements. The contract required the contractor to be provided a certificate after the final inspection, resolution, and acceptance of the project. In addition, the contract required the contractor's testing and commissioning—to include labor, materials, tools, testing devices, and engineering support—to complete a service transfer of the utilities to the local grid system, including any acceptance tests performed by the Ministry of Electricity before the turnover.
5. The objective of the 33-Kilovolt Power Line project was to design and construct equipment required for a 33-kilovolt overhead line from the Nassriya Old Substation to the Al-Shimiyah Substation. To date, the project results are consistent with the original contract objectives. If the current quality of construction and effective project management by United States Army Corps of Engineers, Gulf Region South continue, a new 33-kilovolt overhead power line will be completed that will provide the Thi Qar province area with more reliable and secure transmission of electricity.

Recommendations and Management Comments. This report does not contain any recommendations for corrective action; therefore, management comments were not required. Representatives of the Gulf Region Division of the United States Army Corps of Engineers reviewed a draft of this report and had no comments.

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Introduction

Objective of the Project Assessment

The objective of this project assessment was to provide real-time relief and reconstruction project information to interested parties to enable appropriate action to be taken, when warranted. Specifically, we determined whether:

1. Project components were adequately designed prior to construction or installation;
2. Construction or rehabilitation met the standards of the design;
3. Quality management programs were being utilized adequately;
4. Project sustainability was addressed; and
5. Project results were consistent with original objectives.

Pre-Site Assessment Background

Contract, Task Order and Costs

The 33-kilovolt (kV) Power Line project was initiated under Contract W917BK-07-C-0047, dated 22 August 2007, a firm fixed price construction contract in the amount of \$1,537,560. The contract was between the U.S. Army Corps of Engineers (USACE), Gulf Region South (GRS) and a local contractor. After receiving the Notice to Proceed (NTP), the contractor was to complete construction within 120 calendar days. The NTP was issued on 8 October 2007.

Modification 00001, dated 25 February 2008, provided the contractor with a time extension of 60 days to 4 June 2008. The longer contract period was to allow the contractor to make up for time lost due to: (1) the subcontractor's failure to correctly perform the quality control testing of the concrete tower foundations, (2) flooding of the tower foundation excavations during the months of December and early January 2008, which led to the testing failure of the placed concrete; and (3) installation of culverts that the subcontractor did not provide for the service road.

Project Objective

The overall objective of the 33- Kilovolt (kV) Power Line project was to provide access for the rural population to a more reliable and secure electricity transmission network in the south. In addition, it was intended to reduce blackouts, while supplying electricity to keep the oil refinery working thus enabling more of the population to be employed. Based on the description of work, the objective of the project was to design, construct, and commission all equipment required for a 33-kV overhead line from the Nassriya Old Substation to the Al-Shamiyah Substation in the Thi Qar Province.

Description of the Facility (preconstruction)

The description of the facility (preconstruction) was based on information obtained from the contract and the USACE project file. The 33-kV Power Line project is located in a rural area and inhabited by farmers in the Thi Qar governorate (Figure 1). The Nassriya Southwest Distribution Network Plant is located in the

western outskirts of Nassriya. The area around the site is agricultural and pastoral, with Bedouins migrating through the area. The area east of the Nassriya Southwest Distribution Network Plant is urbanized with homes and businesses located on the main road going into the city.

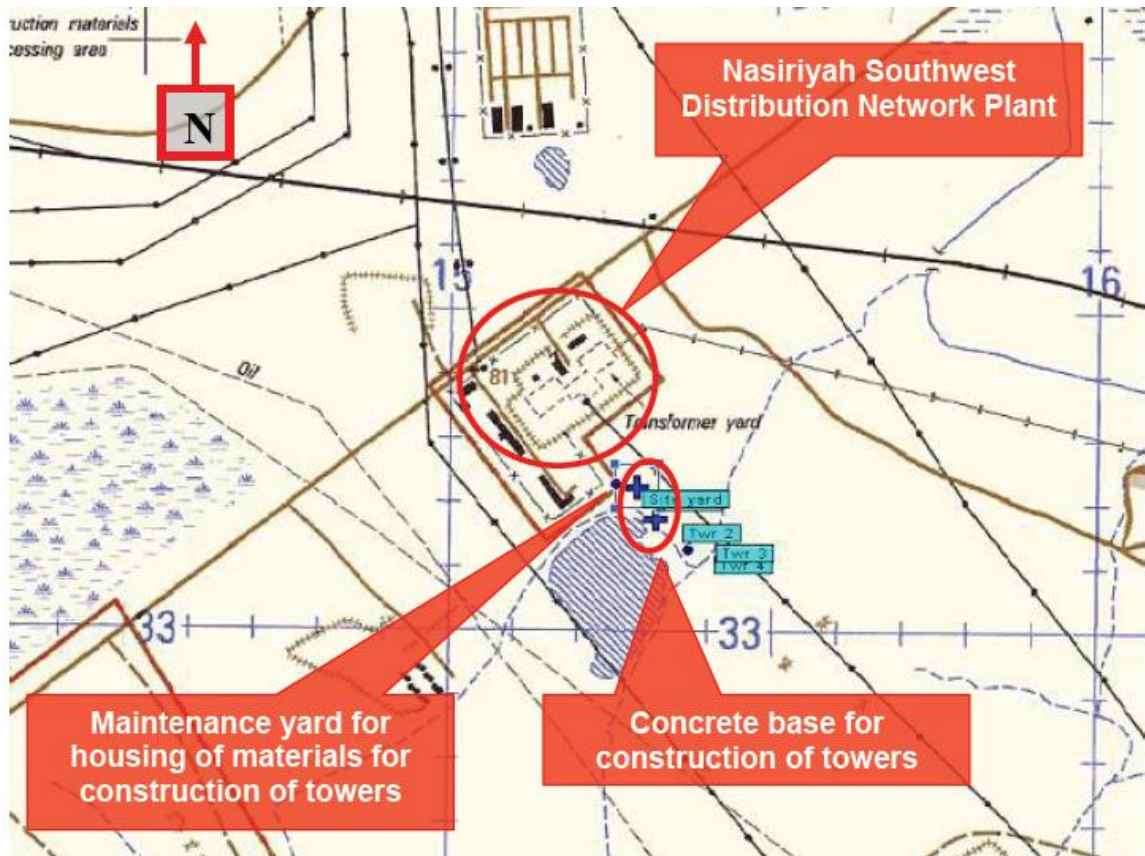


Figure 1. FalconView map of 33-kV power line (Courtesy of the USACE)

Statement of Work

The contract's Statement of Work (SOW) for the project required the contractor to design, engineer, construct, supply, build, and commission a double 33-kV electrical overhead feeder line (referred to as a 33-kV power line) from the Nassriya Old Substation to the Al-Shamiyah Substation. The 33-kV Power Line project consisted of the following:

- Tower 1C (140 units)
- Tower 1C2 (4 units)
- Tower 1E (16 units)
- Tower 1E3 (4 units)
- Tower 1H (4 units)
- Tower 1L (4 units)
- 57,000 meters (m) of aluminum 210/35 square millimeters (mm²)
- Nonconductor disks 11-kV with accessories
- 3,000-m of cable 1 x 400-mm² / 33-kV
- Box end cable 1 x 400-mm² 33-kV internal (12 units)
- Box end cable 1 x 400-mm² 33-kV external (12 units)
- 1000-m copper wire 35-mm²

- Earthen rod with accessories (172 units)
- Fuse switch 33-kV (4 units)
- Lightning rod 33-kV (4 units)
- Equipment for connecting aluminum-aluminum 210-mm² (200 units)
- Service road of approximately 9 kilometers (km)

Current Project Design and Specifications

The contract required the contractor to provide design documents to the GRS Electric and the Adder Area Resident Office, USACE, for review and acceptance. The design documents listed in the contract included route plans, engineering drawings, construction drawings, civil, mechanical, electrical, single line diagrams, and “as-built” drawings. In addition, the engineering plans will include but not be limited to all drawings deemed necessary to construct and place the feeders in service. Also, the contractor will submit route drawings and tower positions for approval, before executing the works.

In addition, the contract required that all materials used on this project will be new and of the highest quality suitable for the purpose intended and the materials will comply with the technical specifications of the Ministry of Electricity and that all items of work be in compliance with the specifications and standards of the Ministry of Electricity.

The USACE provided SIGIR with the contractor’s 33-kV power line one page “route” drawing and one profile sheet. The design documents consisted of the route drawing (Figure 2), which provided the total length for each line with underground cable and a profile sheet that determined the height and length between structures. The contractor’s design documents did not provide complete engineering drawings, including construction, civil, mechanical, and electrical, or single line diagrams.

After reviewing the design drawings and specifications supplied, SIGIR determined the design package available was not complete; it lacked sufficient details and did not meet the contract requirements. Specifically, the design documents did not provide any preliminary alignment plans with topographic survey, soil reports, right-of-way plans, construction drawings (which typically includes plan and profile sheets, detail sheets, quantity sheets, and environmental protection plan sheets), structural calculations, foundation calculations, technical specifications, catalog cuts of equipment specified, general design notes with assumptions made, or standard drawings referenced.

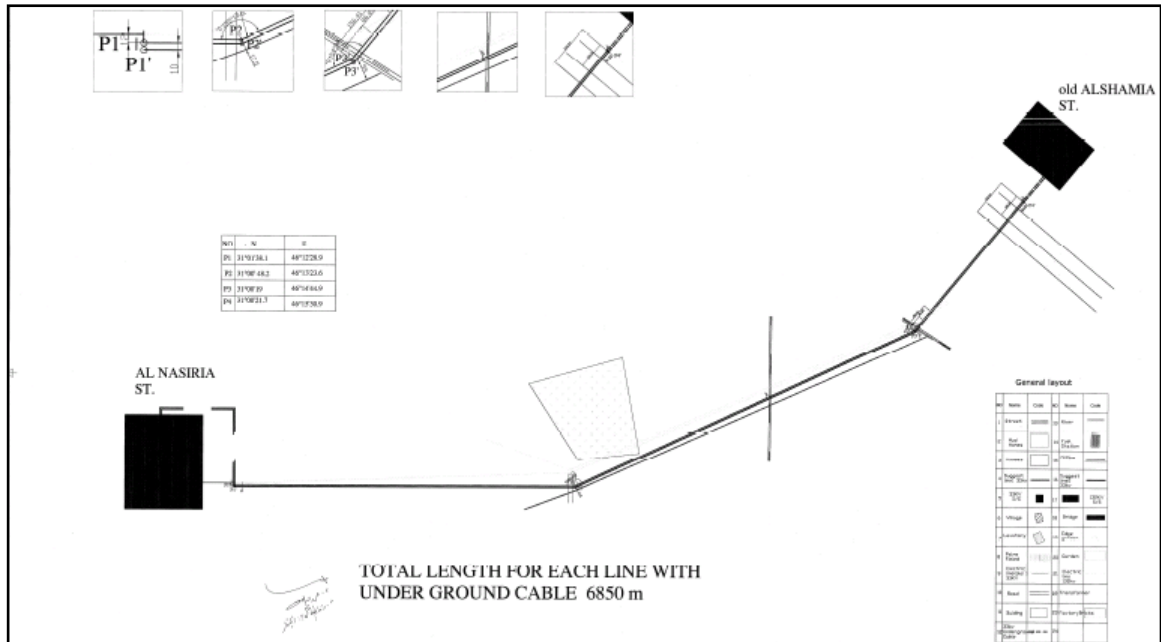


Figure 2. 33-kV power line drawing (Courtesy of the USACE)

Site Assessment

On 13 May 2008 SIGIR, accompanied by the GRS project engineer, performed an on-site assessment of the 33-kV Power Line project. On our visit, there were no crews working on the project. Due to security concerns, we performed an expedited assessment. The time allotted for the site visit was approximately 30 minutes.

Status of Project

According to the Iraq Reconstruction Management System database and the USACE project engineer, the project was 65% complete. The contract required the contractor complete the project within 120 days of the NTP, which GRS issued on 8 October 2007. GRS issued the contractor a 60-day extension due to delays beyond the contractor's control.

Work Completed

Prior to erecting the completed tower, the contractor performed the required excavation, then formed and poured the concrete foundation for the tower (Site Photo 1). The structural concrete SIGIR observed did not have any noticeable cracking, segregation, or honeycombing areas.



Site Photo 1. Completed tower foundation

No other significant work elements were completed prior to the site visit for the project.

Work in Progress

At the time of our site visit, the contractor had not completed the 33-kV power line or the service road (Site Photo 2), which provides access to the towers. For example, the contractor was still excavating tower foundation sites (Site Photo 3), forming up the tower foundations (Site Photo 4), erecting tower bases (Site Photo 5), pouring the concrete base of the towers (Site Photo 6), vibrating concrete base towers (Site Photo 7), finishing the concrete for the tower bases (Site Photo 8), curing the concrete of the tower bases (Site Photo 9), and delivering aggregate to the site (Site Photo 10).



Site Photo 2. Construction of service road (Courtesy of the USACE))



Site Photo 3. Excavation for tower foundation (Courtesy of the USACE))



Site Photo 4. Forming up tower foundation (Courtesy of the USACE))



Site Photo 5. Erecting base of tower
(Courtesy of the USACE)



Site Photo 6. Concrete pour for tower
(Courtesy of the USACE)



Site Photo 7. Vibrating concrete
(Courtesy of the USACE)



Site Photo 8. Finishing concrete
(Courtesy of the USACE)



Site Photo 9. Curing concrete
(Courtesy of the USACE)



Site Photo 10. Aggregate delivered to site
(Courtesy of the USACE)

Work Pending

Since the 33-kV Power Line project was reported as 65% complete at the time of SIGIR's site visit, there was still significant work required to complete the project. The contractor still must excavate, form, and pour the concrete foundations for the remaining towers (excavation, blinding, foundation, columns with fixing tower legs, and back filling); install all types of towers; install the remaining electrical wiring; and complete other underground works (installation of underground cable, laying the cable in the trench, backfilling, jointing and end connections). After all the equipment has been installed, the contractor must perform the final inspections, testing, and commissioning of the 33-kV power line.

Project Quality Management

Contractor's Quality Control Program

Department of the Army Engineering Regulation (ER) 1180-1-6, dated 30 September 1995, provides general policy and guidance for establishing quality management procedures in the execution of construction contracts. According to ER 1180-1-6, "...quality construction is a combined responsibility of the construction contractor and the government."

The contract required that the contractor provide a quality control (QC) plan, which would describe the full extent of QC measures for acceptance and performance of QC throughout the duration of the design, construction, installation, testing, and commissioning of the project. The contractor submitted a QC plan, which listed key personnel, document control methods, special processes, civil works, inspection and testing, records, and the turn over to the USACE. Key personnel for the project were as follows: project manager - responsible for project direction and performance; construction manager - responsible for oversight of all field operations, equipment coordination, and all construction activities; project engineer – responsible for field engineering and technical guidance; and the QC manager – responsible for verifying quality during installation and construction.

The contract required that the contractor maintain construction inspection reports. The QC plan required the QC manager to document the daily inspection activities. The QC reports should include significant construction activities, such as daily site work, materials procured and received, actual versus planned progress recorded on the schedule, site and progress photos, construction inspection reports, testing and inspection reports, and contractor's manpower schedule, which includes the number of workers and how many workers are women.

Even though the contract required QC reports, the contractor submitted only one QC e-mail report for 2007 and did not provide any QC reports for 2008. The QC e-mail report did not identify the contractor's daily activities, the labor strength and production of the various trades for the day, or include photographs. The QC e-mail report did not document the activities on site and did not provide meaningful information to the GRS project engineer. In addition, the QC report did not identify any significant construction deficiencies.

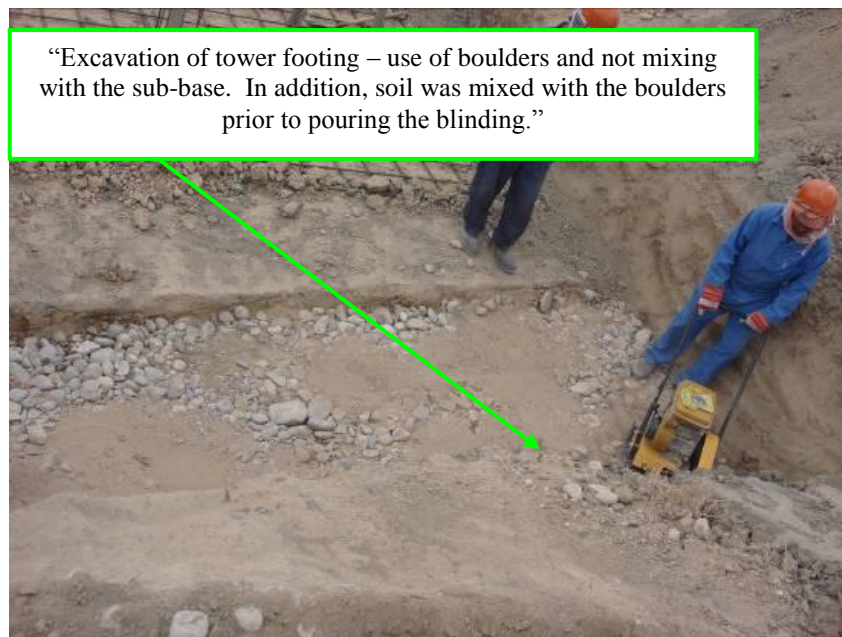
SIGIR's review of the contractor's QC plan and report determined its overall QC program was inadequate.

Government Quality Assurance

The USACE ER 1110-1-12 and PCO Standard Operating Procedure (SOP) CN-100 specified requirements for a government quality assurance (QA) program. Similar to the QC program, the QA program is a crucial oversight technique that demands presence at the construction site. The USACE GRS, which was responsible for administration of the 33-kV Power Line project, had dedicated personnel on site during significant construction activities.

The USACE GRS trained the Iraqi Construction Engineers (ICE), local nationals with engineering backgrounds working for the USACE, and deployed them to the project site to perform QA oversight of the contractor. The ICE were on site during construction events, and monitored field activities and completed daily QA reports, which were forwarded to the USACE GRS project engineer for review. The QA reports documented significant construction activities, such as work performed by building, equipment on site, safety concerns, testing done, and the name and location of the testing facility. In addition, the ICE submits photographs of construction activities taking place throughout the day. Further, the ICE notes any problems/deficiencies identified and the correction actions taken via deficiency logs. Examples of problems noted by the QA representative on site were the “improper excavation and foundation mixing for the tower footing” (Site Photo 11); the potential confusion between the sand that failed the salinity test and the new sand (Site Photo 12); and cube tests (Site Photo 13), which failed the 28-day cure test (Figure 3).

On 2 January 2008, the USACE issued a letter of concern to the contractor regarding the contractor’s failure to install pipe culvert under the service road at points where it crossed irrigation channels (Site Photo 14). As a result local farmers were digging trenches across the service roads at the irrigation canal crossings to allow irrigation water to move from one side of the road to the other. The trenches rendered the service roads unusable. In addition, the QA noted that the contractor’s employees were not QC testing the sub-base material for the service road.



Site Photo 11. Improper excavation and mix for tower footings (Courtesy of the USACE)



Site Photo 14. No pipe culvert on service road (Courtesy of the USACE))

The government's QA program compensated for the inadequate contractor QC program and is ensuring the successful completion of the 33-kV Power Line project.

Project Sustainability

The contract required the contractor to prepare for the USACE's review and approval a complete set of commissioning procedures and test sheets. Testing and commissioning will include labor, materials, tools, testing devices, and engineering support to complete a service transfer of the utilities to the local grid system, including any acceptance tests performed by the Ministry of Electricity prior to turn-over.

The contract required a certificate, signed by the resident/project engineer and a representative of the Ministry, to be issued to the contractor after the final inspection of the project by the resident engineer and the resolution and acceptance of the final punch list items.

Conclusions

Based upon the results of our site visit, we reached the following conclusions for assessment objectives 1, 2, 3, 4, and 5. Appendix A provides details pertaining to Scope and Methodology.

1. Determine whether project components were adequately designed prior to construction or installation.

Adequate design documentation for project components was not available for the 33-Kilovolt Power Line project. The contractor's design package was not complete and lacked sufficient details. Specifically, the design documents did not provide any preliminary alignment plans with topographic surveys, soil reports, right-of-way plans,

construction drawings (detail sheets, quantity sheets, or environmental protection plan sheets), structural calculations, foundation calculations, technical specifications, catalog cuts of equipment specified, general design notes with assumptions made, or standard drawings referenced.

2. Determine whether construction met the standards of the design.

At the time of the site visit, the project was 65% complete. In general, the construction appeared to meet the standards of the Statement of Work. During its visit to the project site, the inspection team did not observe significant deficiencies. The observed construction work associated with the 33-Kilovolt Power Line project appeared to meet the standards of the contract.

3. Determine whether the contractor's quality control plan and the government's quality assurance program were adequate.

The contractor's quality control plan was inadequate to guide a quality management program. Specifically, the quality control plan required the contractor to maintain construction inspection reports. The contractor provided to the Gulf Region South project engineer one quality control report that did not provide meaningful information and did not identify any significant construction deficiencies. The quality control plan did provide specific details regarding the responsibilities of key personnel, document control methods, special processes, civil works, inspection and testing, records, and the turnover to the United States Army Corps of Engineers process.

Despite the weaknesses in contractor quality control, the government's quality assurance program was effective in ensuring that the construction of the 33-Kilovolt Power Line project was adequate. The United States Army Corps of Engineers quality assurance representatives maintained daily quality assurance reports, which documented deficiencies identified at the site. SIGIR found these reports to be sufficiently complete, accurate, and timely. The reports contained project-specific information to document construction progress and highlight deficiencies. Also, the quality assurance representatives supplemented the daily reports with detailed photographs that reinforced the narrative information provided in the reports. Further, the quality assurance team followed up on any reported deficiencies to confirm that the contractor took the necessary corrective actions. The government's quality assurance program compensated for the inadequate contractor quality control program and is ensuring the successful completion of the 33-Kilovolt Power Line project.

4. Determine if project sustainability was addressed.

Sustainability was addressed in the contract requirements. The contract required the contractor to be provided a certificate after the final inspection, resolution, and acceptance of the project. In addition, the contract required the contractor's testing and commissioning—to include labor, materials, tools, testing devices, and engineering support—to complete a service transfer of the utilities to the local grid system, including any acceptance tests performed by the Ministry of Electricity before the turnover.

5. Determine whether project results were consistent with original objectives.

The objective of the 33-Kilovolt Power Line project was to design and construct equipment required for a 33-kilovolt overhead line from the Nassriya Old Substation to the Al-Shimiyah Substation. To date, the project results are consistent with the original contract objectives. If the current quality of construction and effective project

management by United States Army Corps of Engineers, Gulf Region South continue, a new 33-kilovolt overhead power line will be completed that will provide the Thi Qar province area with more reliable and secure transmission of electricity.

Recommendations and Management Comments

This report does not contain any recommendations for corrective action; therefore, management comments were not required. Representatives of the Gulf Region Division of the U.S. Army Corps of Engineers reviewed a draft of this report and had no comments.

Appendix A. Scope and Methodology

SIGIR performed this project assessment from February through June 2008 in accordance with the Quality Standards for Inspections issued by the President's Council on Integrity and Efficiency. The assessment team included an auditor/inspector and a professional engineer/inspector.

In performing this Project Assessment the SIGIR assessment team:

- Reviewed contract documentation to include the following: contract, modification, scope of work, and notice to proceed;
- Reviewed the design package (drawings and specifications), quality control plan, contractor's quality control reports, U.S. Army Corps of Engineers quality assurance reports, reconstruction liaison team reports, construction progress photos;
- Interviewed the U.S. Army Corps of Engineers, Gulf Region South Officer In Charge/area engineer; and
- Conducted an on-site assessment of the 33-Kilovolt Power Line project on 13 May 2008 and documented the results of the 33-Kilovolt Power Line project in Nassriya, Iraq.

Appendix B. Acronyms

ER	Engineering Regulation
GRD	Gulf Region Division
GRS	Gulf Region South
ICE	Iraqi Construction Engineers
kV	Kilovolt
QA	Quality Assurance
QC	Quality Control
SIGIR	Special Inspector General for Iraq Reconstruction
SOP	Standard Operating Procedure
SOW	Statement of Work
USACE	United States Army Corps of Engineers

Appendix C. Report Distribution

Department of State

Secretary of State

Senior Advisor to the Secretary and Coordinator for Iraq

Director of U.S. Foreign Assistance/Administrator, U.S. Agency for
International Development

Director, Office of Iraq Reconstruction

Assistant Secretary for Resource Management/Chief Financial Officer,
Bureau of Resource Management

U.S. Ambassador to Iraq

Director, Iraq Transition Assistance Office

Mission Director-Iraq, U.S. Agency for International Development

Inspector General, Department of State

Department of Defense

Secretary of Defense

Deputy Secretary of Defense

Under Secretary of Defense (Comptroller)/Chief Financial Officer

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Security Affairs

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Director, Defense Finance and Accounting Service

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Principal Deputy to the Assistant Secretary of the Army for Acquisition,
Logistics, and Technology

Deputy Assistant Secretary of the Army (Policy and Procurement)

Commanding General, Joint Contracting Command-Iraq/Afghanistan

Assistant Secretary of the Army for Financial Management and Comptroller

Chief of Engineers and Commander, U.S. Army Corps of Engineers

Commanding General, Gulf Region Division

Chief Financial Officer, U.S. Army Corps of Engineers

Auditor General of the Army

U.S. Central Command

Commanding General, Multi-National Force-Iraq

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Inspector General, U.S. Agency for International Development
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President, U.S. Institute for Peace

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Senate Committee on Foreign Relations
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 Subcommittee on International Operations and Organizations, Democracy and Human Rights
 Subcommittee on Near Eastern and South and Central Asian Affairs
Senate Committee on Homeland Security and Governmental Affairs
 Subcommittee on Federal Financial Management, Government Information, Federal Services, and International Security
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 Subcommittee on the Middle East and South Asia

Appendix D. Project Assessment Team Members

The Office of the Assistant Inspector General for Inspections, Office of the Special Inspector General for Iraq Reconstruction, prepared this report. The principal staff members who contributed to the report were:

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